

Effect testing of the chemicals for controlling pine needle bright

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Abstract The indoor toxicity determination for several chemicals were carried out on *Septoria pini-putmlae* and *Dothistroma pini*. The results showed that Carbendazol, Zineb and Thiophanate-methyl had better effect of killing the fungi. The field experiment indicated that Zineb wettable powder with concentrations of 1:200, 1:300 and 1:500 had 79.2%, 67.2% and 59.7% control results respectively. The control results of 1:200 Carbendazol wettable powder and 1:200 Thiophanate-methyl wettable powder were 67.7% and 67% respectively.

Key words: *Pinus sylvestris* var. *Mongolica*, Needle bright disease, *Septoria pini- putmlae*; *Dothistroma pini*; Chemical control, Chemical effect testing

A large area of scotch pines (*Pinus sylvestris* var. *mongolica*) was destroyed by *Septoria pini-putmlae* and *Dothistroma pini* in Honghuaerji forest region, Inner Mongolia, in 1990~1997. The outputs of seeds and cones were reduced. No report on control of *Septoria pini-putmlae* has been found in China. The two diseases most seriously destroyed scotch pines. In 1990~1994, the infected rate of nursery stock reached 97.3% and about 60000 hm² trees were infected in different degrees. At present, the control technique for the mixed infection of the two diseases has not been reported. So this paper has done some research works on this respect.

Test methods

Disease Index

The disease index of the selected sample plots were listed in Table 1.

Table 1. Disease Index

Sample plot	Disease index
Zhaolaohan (1)	37.2
Zhaolaohan (2)	37.9
Seed bearer plantation	43.8
Northern slope of Duluguding	57.6
Southern slope of Zhaolaohan	31.7
Toudaoqiao planting site	34.3
Wanghuolou	46.3

Chemicals

Four kinds of chemicals were used in the experiment. They are 70% Carbendazol wettable power, 50% Zineb wettable powder, 65% Thiophanate-methyl wettable power and Chlorothalonil smoke.

Laboratory effect testing

After the fungi were separated and purified, the in-

door effect determining of chemicals was carried out in April 15, 1995. A steel ring with no fungi and bacteria was put on the middle of a plate. One mL liquid chemical was dropped in the steel ring and 4 points of pathogen were set around the ring. The culture plate was kept at a constant of 25 °C for 20 d and then the size of fungi community was measured. Three repeats were made for each chemical.

Field effect testing

Thirty trees were selected for every sample plot. The concentrations of 1:200, 1:300, 1:500, 1:650 and 1:1000 for Carbendazol, Zineb and Thiophanate-methyl wettable powders were experimented. 3MFF-2A spraying machine was used. The amount of Chlorothalonil used in experiment was 7.5 kg/hm².

The control results were determined through checking the disease index before and after the control according to the rating standard of disease index (Table 2).

Table 2. The table of rating standard of disease index

Disease rating	Value	Degree of disease
I	0	No infected leaves
II	1	25% of leaf area were infected
III	2	26%~50% of leaf area infected
IV	3	51%~75% of leaf area infected
V	4	More than 76% leaf area infected

Results

Effect testing for different chemicals

Seven chemicals were used to measure the effects on *Septoria pini-putmlae* and *Dothistroma pini*. The results are listed in Table 3. The effect of Carbendazol, Zineb and Thiophanate-methyl were better than that of other chemicals.

Table 3. The effect of different chemicals

Chemicals	Concentration×	(A) 20 d circle /mm	Concentration ×	(B) 20 d circle /mm
Thiophanate-methyl	200	3.7	200	4.2
Tuzet	200	6.2	200	5.8
Zineb	200	3.4	200	3.1
Carbendazim	200	4.9	200	4.6
Phenazine	200	4.7	200	4.8
Fenaminosulf	200	5.5	200	5.1
Amnam	200	5.9	200	6.0
Contrast	pure water	0	pure water	0

(A)—*Septoria pini-putmiae*; (B)—*Dothistroma pini*.**The results of outdoor effect testing**

The field control of pine needle bright was conducted

Table 4. The results of control in forest

Plot No.	Chemicals	Concentration	Disease index	Disease index after control	Controlled rate %	Investigation date/ experimental date
9501	Zineb	1:200	44.1	9.2	79.2	1996-06-28/1995-06-18
9502	Zineb	1:300	41.4	13.6	67.2	1996-06-28/1995-06-18
9503	Zineb	1:500	48.1	19.4	59.7	1996-06-28/1995-06-18
9504	Zineb	1:650	29.7	24.9	19.2	1996-06-28/1995-06-18
9505	Zineb	1:1000	22.8	19.7	13.5	1996-06-28/1995-06-18
9506	Pure water	contrast	57.6	55.3	-- --	1996-06-28/1995-06-18
9507	Carbendazol	1:200	5.8	2.1	63.7	1996-06-28/1995-06-19
9508	Carbendazol	1:300	46.7	23.7	49.2	1996-06-28/1995-06-19
9509	Carbendazol	1:500	28.7	18.9	34.1	1996-06-28/1995-06-19
9510	Carbendazol	1:650	51.8	40.5	21.8	1996-06-28/1995-06-19
9511	Carbendazol	1:1000	56.7	48.4	14.6	1996-06-28/1995-06-19
9512	Pure water	contrast	46.3	46.5	-- --	1996-06-28/1995-06-19
9513	Thiophanate-methyl	1:200	56.7	18.7	67.0	1996-06-26/1995-06-20
9514	Thiophanate-methyl	1:300	45.6	23.4	48.6	1996-06-26/1995-06-20
9515	Thiophanate-methyl	1:500	41.6	24.7	40.6	1996-06-26/1995-06-20
9516	Thiophanate-methyl	1:650	43.9	30.0	31.6	1996-06-26/1995-06-20
9517	Thiophanate-methyl	1:1000	31.4	25.6	18.4	1996-06-26/1995-06-20
9518	Pure water	contrast	34.3	31.1	-- --	1996-06-26/1995-06-20
9519	Pengjunling	smoke	36.7	26.3	28.3	1996-07-02/1996-06-17
9520	Chlorothalonil	smoke	46.7	23.5	49.7	1996-07-02/1996-06-17

Conclusion

According to the indoor effect testing of seven chemicals, Carbendazol, Zineb and Thiophanate-methyl have good effect. So 70% Carbendazol wettable powder, 50% Zineb wettable powder and 65% Thiophanate-methyl were selected to carry out effect experiment outdoors. The effect of Zineb wettable powder with concentrations of 1:200, 1:300 and 1:500 were 79.2%, 67.2% and 59.7% respectively. The effect of 1:200 Carbendazol wettable powder and 1:200 Thiophanate-methyl wettable powder were 63.7% and 67% respectively. The effect of Pengjunling was not good because the amount of Pengjunling used was little and efficient element was not enough. The effect of Chlorothalonil had 49% control effect, better than that of Pengjunling.

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(Responsible Editor: Chai Ruihai)